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AUTHOR	Hall, George L.
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ABSTRACT

Based on a needs assessment of intra-state and inter-state interconnection telecommunication services, the Virginia Public Telecommunications Council (VPTC) envisions a public service satellite system consisting of: (1) primarily broadband transceiver capacities to areas having state supported institutions of higher education, perhaps with common carrier supplied narrow-band extensions to various state agencies; and (2) narrow-band transceiver capacities located in areas lacking institutions of higher education but having a School Division Headquarters, with narrow-band extensions (common carrier supplied) to various state agencies. This system would interconnect directly with compatible transceivers within satellite range. Traffic protocols would be centrally managed from Richmond and coordinated with the national satellite operating authority. (DAG)

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Virginia Public Telecommunications Council
902 Ninth Street Office Building
Richmond, 23219
(804) 770-3153

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NEW INTERCONNECTION TELECOMMUNICATIONS NEEDS IN VIRGINIA

After conducting a Needs Assessment of intra-state and inter-state interconnection telecommunications services which are, or should come to be, required by the numerous State agencies and institutions, the VPTC can summarize its tentative findings* as follows:

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*Largely excluded from this summary are conventional voice-grade CCO-supplied services except slow-speed data and facsimile transmission.

VPTC
4/12/76

BROADBAND SERVICES (In Priority Order)

Administrative Audio-video Conferencing and Interviewing

Virtually all State Agencies and institutions, especially those having field offices, installations or activities or those having significant inter-state contacts

Audio-video Instructional Programming

Higher Education* (Internal and via ETV)

Public Education (via ETV)

State Personnel Training (especially through State Personnel System)

High-speed Data (Including parallel telemetry signals)

Higher Education (Administrative, Research, CMI)

ADP (Acting for other agencies and institutions)

Highway (Traffic Counting and structural stress monitoring)

Environmental Agencies (Air and Water Monitoring)

Medical Institutions (Diagnostic Examinations)

High-speed Facsimile

Higher Education - Libraries

Certain agencies and institutions having field offices, installations or activities near appropriate facilities

ETV Entities (Curricular guides and phychometric instruments)

*Includes Medical, Dental and Nursing; pre-service and in-service.

Public Television Networking

All ETV Entities (5-6 sites)

Video Site Monitoring (Only where feasibly extendable)

Environmental Agencies (Smoke Abatement, etc.)

Highway Department (Traffic Flow)

Forestry (Fire Monitoring)

Engineering and Buildings (Construction status compilations on VTR)

NARROWBAND SERVICES (In Priority Order)

Slow-speed Data

Virtually all agencies and institutions having field offices, installations or activities

ADP (Acting for other agencies and institutions)

Alert and Alarm Signaling (Separate from CCO Systems)

State Police

Office of Emergency Services (Civil Defense)

Highway Department (Traffic Interruptions)

Emergency Voice Networking (Separate from CCO Systems)

State Police

Office of Emergency Services (Civil Defense)

Highway Department (Traffic Interruptions)

Telemetry Signaling

Highway (Traffic counting and structural stress monitoring)

Environmental Agencies (Air and Water Monitoring)

Medical Institutions (Diagnostic Examinations)

Servo Control Signaling

Highway Traffic Control (Computerized or manual)

NARROWBAND SERVICES - (Continued)

Slow-speed Facsimile

Virtually all agencies and institutions having field offices, installations or activities

Public Radio Networking

All Public Radio Stations (10 Sites - Voice grade only)

Instructional Programming (Audio and/or Slow scan Video)

Higher Education (Internal and via radio)

Public Education (Largely via radio)

State Personnel Training (especially through State Personnel System)

Administrative Audio Conferencing

Virtually all agencies and institutions

Aural Monitoring

Environmental Agencies (Noise Control)

Video Site Monitoring (Slow scan)

Environmental Agencies (Smoke abatement, etc.)

Highway Department (Traffic Flow)

Forestry (Fire Monitoring)

We envision in Virginia a PUBLIC SERVICE SATELLITE SYSTEM which consists of:

(a) primarily, broadband transceiver capacities in those 31 Virginia "locality clusters" having state-supported institutions of higher education, perhaps with common-carrier-supplied (or radio-spectrum) narrow-band extensions to each nearby School Division Headquarters, DMV local office, Highway Department Depot, State Hospital facility, local hospital, Corrections installation, Health Department Office, Welfare Office, Environmental Monitoring facility, Employment Office, Public Telecommunications Entity*, public radio station**, State Police Headquarters as well as the principal sites of local government and local law enforcement administration. In those 8 localities where there are several institutions of higher education in close vicinity, broadband links can be used to inter-connect them with the nearby transceivers. (There are 16 such installations in all).

(b) perhaps also, narrow-band transceiver capacities in all or certain of those 52 Virginia "locality clusters" lacking an institution of higher education but having a School Division Headquarters, with common-carrier-supplied (or radio spectrum) narrow-band extensions to each nearby DMV local office, Highway Department Depot, State Hospital facility, local hospital, Corrections installation, State-owned radio station, Health Department Office, Welfare Office, Environmental Monitoring facility, Employment Office, State Police Headquarters as well as the principal sites of local government and local law enforcement administration.

*The five regional Public Telecommunications Entities would actually provide suitable broadband links from their Master Control Rooms to and from the closest transceiver sites.

**Similarly, CPB-qualified public radio stations in Richmond, Norfolk, Roanoke, Harrisonburg and Fairfax would provide high-fidelity, audio-bandwidth links to and from their own Control Rooms.

N.B. Broadband and/or narrowband extensions could also often be accomplished through local CATV systems.

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The regional multiplexing broadband facilities would be employed to receive, send and relay duplexed video (cinematized), high fidelity or voice-grade audio (including various slow-scan video formats), high-speed and slow-speed data (including facsimile, telemetry, servo and alarm signals).

The local limited-multiplexing narrowband capacities would be employed to receive, send and relay duplexed voice-grade audio (including certain slow-scan video formats) and slow-speed data (including facsimile, telemetry, servo and alarm signals).

BTP terminal systems would include:

Video Monitors and/or recorders
High-fidelity Audio Monitors and/or recorders
High-speed Facsimile Print-outs and/or copiers
High-speed Computer Inter-faces
Parallel Telemetry Mechanisms and recorders

NTP terminal systems would include:

Slow-scan Video Monitors and/or recorders
Audio Monitors and/or recorders
Slow-speed Facsimile Print-outs and/or copiers
Slow-speed Computer inter-faces (including Teletypewriters)
Alarm Mechanisms
Telemeters and/or signal recorders
Servo Control Mechanisms

Concomitant Origination Systems would include:

Video Cameras and Mixers
Audio-video recorders/playback machines
Microphones and Audio Processors/Mixers
Audio recorder/playback machines and Rate Change Devices
Facsimile Encoders (Micro-form and other)
Teletypewriters
Keypunchers and Readers
Cathode-ray writers and similar electro-optical device systems
Data recorder/playback machines
Environmental Sensors and Meters (Heat Light, Chemical, etc.)
Stress and pressure sensors and meters
Signal Activators (Manual and programmed)
Computers (Digital or Analog)
Medical Sensor Instruments

The envisioned Broadband interconnection system would likely require:

(a) 2 hours of broadband single-channel service between 8 a.m. and 5 p.m. each workday.

(b) 2 hours of broadband single-channel service between 5 p.m. and 11 p.m. each weeknight.

(c) 2 hours of broadband single-channel service between 11 p.m. and 8 a.m. each day.

If double-channel broadband capacities were made available, overall time requirements might be halved.

Narrowband requirements would be:

(a) 24 hour instant access to an emergency channel

(b) 10 minutes per hour on a data conditioned channel (to be used largely in a polling, share-time mode for critical update relaying)

(c) 2 continuous hours in the 8 a.m. - 5 p.m., 5 p.m. to 11 p.m. and 11 p.m. to 8 a.m. time periods each day.

(d) 1 minute in every 5 for relay of telemetered data on a conditioned channel (to be used in a polling, share-time mode)

All figures are minimums.

NOTE: It is presumed that Narrowband facilities would be devised and used only where, and to the extent that, CCO-supplied circuits or conventional microwave or radio links are unavailable, more expensive, significantly less reliable, or technically inferior.

SYSTEM REACH

The envisioned intra-and-inter-state Interconnection System should be designed to allow any Virginia Transceiver to interconnect directly with any other technically compatible transceiver within satellite range but under strict traffic protocols which are managed from a central organizational point in Richmond and which are in turn fully integrated with overall traffic configurations determined by the national satellite operating authority.

STRUCTURAL OUTLOOK

The VPTC believes that there is strong merit in the concept that the five Public Telecommunications Entities in Virginia become jointly the principal intra-state operators of the public service satellite system elements described herebefore, interfacing them where logical with CCO and state-owned radio-spectrum or computer facilities. Such an arrangement might best be effected by having the entities incorporate with the VPTC (acting on behalf of the Commonwealth government) as an ADDED VALUE NETWORK ORGANIZATION (AVNO). In this way, the interconnection system would be "synergized" through the regular accessing of media production, storage, maintenance, design, and management resources.

The AVNO, centered at Richmond, would be responsible for clearing and implementing all intra-state and inter-state switching protocols with the national satellite operating organization.

Probable BROADBAND TRANSCEIVER POINTS ("Locality Clusters" Showing Community College, College, University Campuses, and Telecommunications Entities Within)

1 - Richmond U(2) + CC(2) + WCVE/WCVW + FM

2 - Norfolk U + C + CC(3) + WHRO + FM

3 - Wallops Island CC

4 - Newport News* C + CC

5 - Franklin CC

6 - Gloucester County* (Glenns) CC

7 - Williamsburg C

8 - Richmond County (Warsaw) CC

9 - Dinwiddie County (Petersburg) C + C + CC

10 - Alberta CC

11 - Farmville C

12 - Keysville* CC

13 - Fredericksburg C + CC

14 - Fairfax (Annandale) CC(3) + U + WNVT + FM

15 - Loudon County (Leesburg)* CC

16 - Middletown CC

17 - Harrisonburg C + WVPT + FM

18 - Augusta County (Weyers Cave)* CC

19 - Charlottesville U + CC

20 - Lexington C

21 - Clifton Forge CC

22 - Danville CC

23 - Lynchburg CC

24 - Roanoke CC + WBRA/WSVN + FM

25 - Abington CC

26 - Wise C (+ WSVN?)

27 - Richlands CC

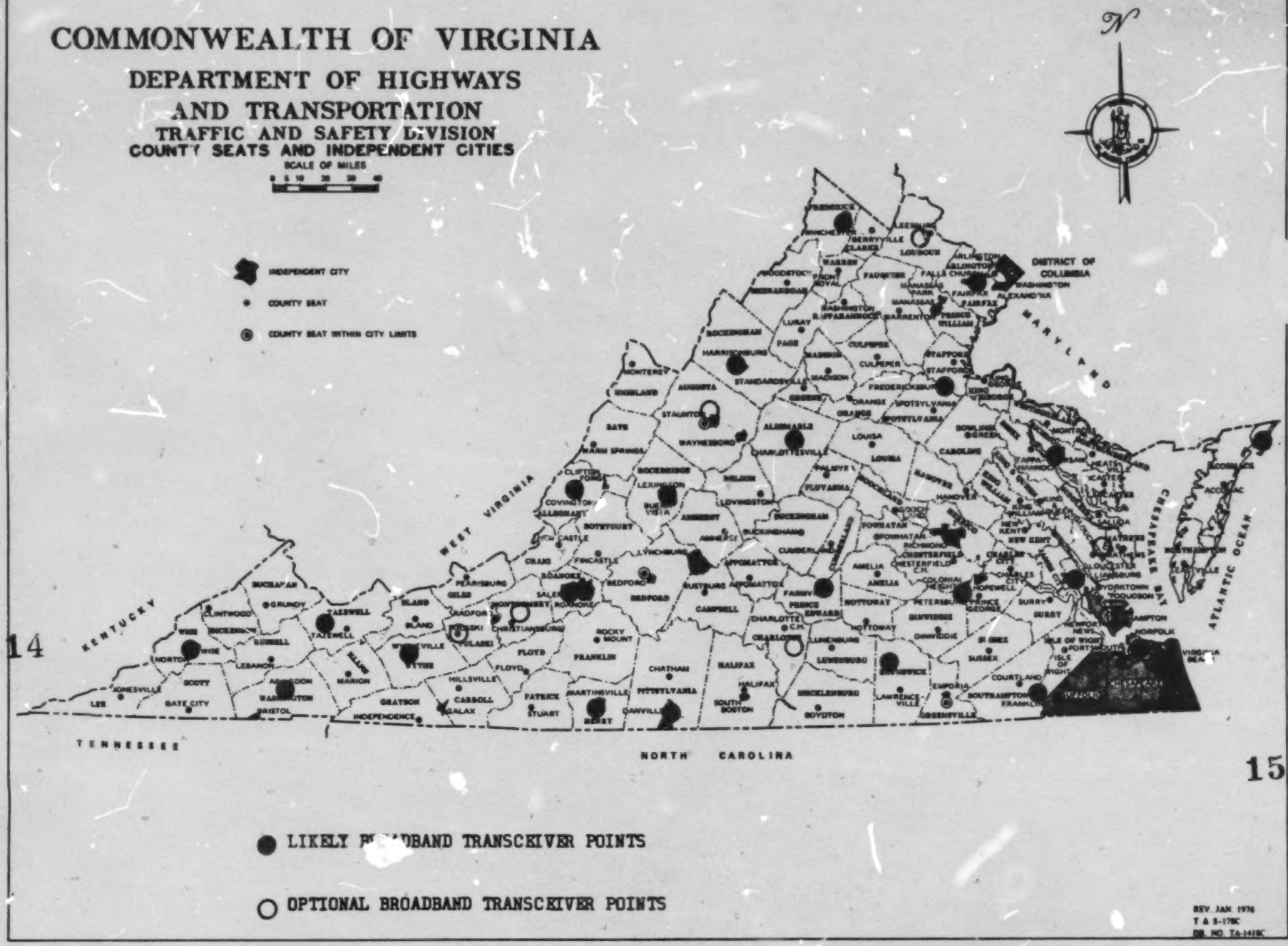
28 - Wytheville CC

29 - Blacksburg* U + C

30 - Dublin* CC

31 - Martinsville CC

*These seven points might be combined with others, reducing the number of BTPs to 24.


COMMONWEALTH OF VIRGINIA
DEPARTMENT OF HIGHWAYS
AND TRANSPORTATION
TRAFFIC AND SAFETY DIVISION
COUNTY SEATS AND INDEPENDENT CITIES
SCALE OF MILES
0 5 10 20 30 40
INDEPENDENT CITY
COUNTY SEAT
COUNTY SEAT WITHIN CITY LIMITS
N
DISTRICT OF COLUMBIA
WASHINGTON
ALEXANDRIA
ARLINGTON
FAIRFAX
PRINCE WILLIAM
MANASSAS
MANASSAS PARK
LOUDOUN
FAUQUIER
CULPEPER
STAFFORD
FREDERICKSBURG
SPOTSYLVANIA
ORANGE
MADISON
GREENE
ALBEMARLE
CHARLOTTESVILLE
FLUVANNA
LOUISA
GOOCHLAND
POWHATAN
RICHMOND
CHESTERFIELD
HENRICO
NEW KENT
CHARLES CITY
JAMES CITY
YORKTOWN
WILLIAMSBURG
GLOUCESTER
MATHEWS
MIDDLESEX
ESSEX
KING WILLIAM
KING AND QUEEN
KING GEORGE
WESTMORELAND
NORTHUMBERLAND
LANCASTER
RICHMOND
WARREN
SHENANDOAH
PAGE
ROCKINGHAM
HARRISONBURG
AUGUSTA
STAUNTON
WAYNESBORO
BATH
HIGHLAND
ALLEGHANY
CLIFTON FORGE
COVINGTON
BOTETOURT
CRAIG
ROANOKE
SALEM
BEDFORD
LEXINGTON
BUENA VISTA
AMHERST
LYNCHBURG
CAMPBELL
APPOMATTOX
BUCKINGHAM
CUMBERLAND
FARMVILLE
PRINCE EDWARD
CHARLOTTE
LUNENBURG
MECKLENBURG
BRUNSWICK
EMPORIA
GREENSVILLE
SUSSEX
SURRY
PETERSBURG
HOPEWELL
COLONIAL HEIGHTS
AMELIA
NOTTOWAY
DINWIDDIE
PRINCE GEORGE
CHESTERFIELD C.H.
CHARLES CITY C.H.
NEWPORT NEWS
HAMPTON
NORFOLK
PORTSMOUTH
SUFFOLK
ISLE OF WIGHT
VIRGINIA BEACH
CHESAPEAKE
SOUTHAMPTON
FRANKLIN
COURTLAND
LAWRENCEVILLE
BOYDTON
SOUTH BOSTON
HALIFAX
PITTSYLVANIA
DANVILLE
MARTINSVILLE
HENRY
PATRICK
STUART
FLOYD
FRANKLIN
ROCKY MOUNT
CHATHAM
HILLSVILLE
CARROLL
GALAX
GRAYSON
INDEPENDENCE
WYTHE
BLAND
GILES
PEARISBURG
NARROWS
CHRISTIANSBURG
MONTGOMERY
RADFORD
PULASKI
TAZEWELL
BUCHANAN
GRUNDY
RUSSELL
BUCKHANNON
WISE
NORTON
DICKENSON
CLINTWOOD
LEBANON
ABINGDON
WASHINGTON
BRISTOL
SCOTT
GATE CITY
LEE
JONESVILLE
MARION
WEST VIRGINIA
KENTUCKY
TENNESSEE
NORTH CAROLINA
ATLANTIC OCEAN
CHESAPEAKE BAY
MARYLAND
14
15
LIKELY BROADBAND TRANSCEIVER POINTS
OPTIONAL BROADBAND TRANSCEIVER POINTS
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Possible, additional Narrowband Transceiver Points ("Locality Clusters")

(It is likely that transceivers will not be needed at all points identified below)

1 - Northampton County

2 - Suffolk

3 - Isle of Wight County

4 - Surry County

5 - Lancaster - Northumberland Counties

6 - King and Queen - Middlesex Counties

7 - Sussex County

8 - Essex County

9 - Westmoreland County

10 - King George County

11 - Caroline County

12 - Hanover County

13 - Greensville County

14 - Mecklenburg County

15 - Nottoway County

16 - Amelia County

17 - Powhatan County

18 - Goochland County

19 - Louisa County

20 - Fluvanna County

21 - Buckingham County

22 - Appomattox County

23 - Charlotte County

24 - Halifax County

25 - Franklin County

26 - Patrick County

27 - Floyd County

28 - Carroll County

29 - Grayson County

30 - Smyth County

31 - Scott County

32 - Lee County

33 - Russell County

34 - Dickenson County

35 - Buchannan County

36 - Bland County

37 - Giles County

38 - Craig County

39 - Bedford County

40 - Botetourt County

41 - Amherst County

42 - Nelson County

43 - Cumberland County

44 - Bath County

45 - Highland County

46 - Madison County

47 - Page County

48 - Shenandoah County

49 - Warren-Rappahannock Counties

50 - Culpeper County

51 - Stafford County

52 - Fauquier County

PHASING PRIORITIES

Assuming the demonstrated cost-effectiveness of the capacities and facilities to be involved at each installation phase, the VPTC tentatively anticipates the following priority schedule for the development of the interconnection system envisioned:

(a) Main BTP at Richmond interconnected through satellite to comparable State BTPs elsewhere (but especially in the East) and BTPs at Norfolk. Roanoke and Fairfax (4 BTPs)

(b) BTPs at Harrisonburg and Wise (2 BTPs)

(c) BTPs at Danville, Fredericksburg, Wallops Island, Williamsburg, Farmville, Abingdon, and Charlottesville (7 BTPs)

(d) BTPs at Franklin, Warsaw, Petersburg, Alberta, Middletown, Lexington, and Wytheville (7 BTPs)

(e) BTPs at Clifton Forge, Lynchburg, Richlands, Martinsville, Blacksburg*, Newport News*, and Leesburg* (4-7 BTPs)

(f) BTPs at Keysville*, Weyers Cave*, Dublin* and Glenns* (up to 4 BTPs)

(g) NTPs at Greensville County, Halifax County, Lee County, Highland County, Louisa County, Culpeper County, Grayson County, Lancaster-Northumberland Counties (8 NTPs)

(h) Other NTPs as required (up to 44 NTPs)

*Engineering studies might obviate need for these BTPs by extending broadband services from other locality clusters nearby.

AGENCIES DIRECTLY PARTICIPATING IN NEEDS ASSESSMENT SURVEY OF NEW INTERCONNECTION SERVICES

Division of State Planning & Community Affairs

State Water Control Board

Office of Emergency Services

Council On Higher Education

Department of Highways & Transportation

Division of Automated Data Processing

Air Pollution Control Board

State Library

Department of Health

Department of Purchases & Supply

Department of Community Colleges

Highway Safety Division

State Corporation Commission

Department of Mental Health & Mental Retardation

Department of Corrections

Department of Welfare

Division of Motor Vehicles

Department of Education

Division of Engineering & Buildings

Employment Commission

Virginia Institute of Marine Science

State Police

State Forestry Service

VPI & State University

Medical College of Virginia - Health Science Division

AGENCIES DIRECTLY PARTICIPATING IN NEEDS ASSESSMENT SURVEY

University of Virginia

University of Virginia Hospital

Central Virginia ETV Corporation

Shenandoah Valley ETV Corporation

Blue Ridge ETV Association, Incorporated

Hampton Roads ETV Association, Incorporated

WVWR - FM Radio

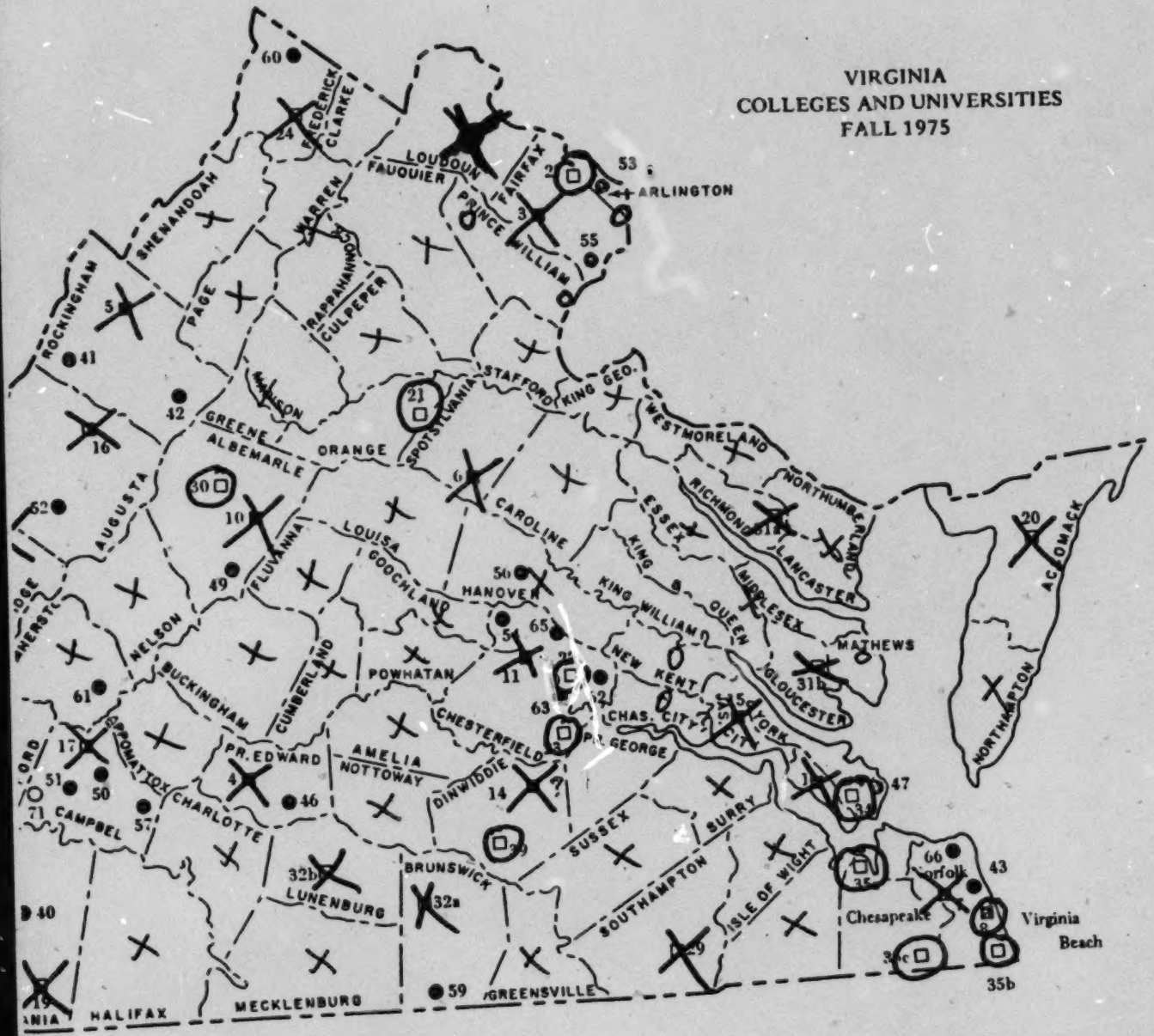
WRFK - FM Radio

WMRA - FM Radio

Common Carrier Telephone Companies of Virginia

X = 1. HE Enrollment BTP 30 K
O = 1 HE limits

X = NTP
O = NTP limits



PUBLIC INSTITUTIONS

■ Four-Year Colleges and Universities

1 Christopher Newport College, Newport News
2 Clinch Valley College, Wise
3 George Mason University, Fairfax
4 Longwood College, Farmville
5 Madison College, Harrisonburg
6 Mary Washington College, Fredericksburg
7 Norfolk State College, Norfolk
8 Old Dominion University, Norfolk
9 Radford College, Radford
10 University of Virginia, Charlottesville
11 Virginia Commonwealth University, Richmond
12 Virginia Military Institute, Lexington
13 Virginia Polytechnic Institute and State University, Blacksburg
14 Virginia State College, Petersburg
15 The College of William and Mary, Williamsburg

□ Community and Two-Year Branch Colleges

16 Blue Ridge Community College, Weyers Cave
17 Central Virginia Community College, Lynchburg
18 Dabney S. Lancaster Community College, Clifton Forge
19 Danville Community College, Danville
20 Eastern Shore Community College, Wallops Island
21 Germanna Community College, Fredericksburg
22 J. Sargeant Reynolds Community College, Richmond
23 John Tyler Community College, Chester
24 Lord Fairfax Community College, Middletown
25 Mountain Empire Community College, Big Stone Gap
26 New River Community College, Dublin
27 Northern Virginia Community College
- Alexandria
- Annandale
- Loudoun
- Manassas
- Woodbridge

28 Patrick Henry Community College, Martinsville
29 Paul D. Camp Community College, Franklin
30 Piedmont Virginia Community College, Charlottesville
31 Rappahannock Community College
- (a) Warsaw
- (b) Glenns

32 Southside Virginia Community College
- (a) Christanna Campus - Alberta
- (b) John H. Daniel Campus - Keysville

33 Southwest Virginia Community College, Richlands
34 Thomas Nelson Community College, Hampton
35 Tidewater Community College
- (a) Frederick Campus - Portsmouth
- (b) Virginia Beach Campus - Camp Pendleton
- (c) Chesapeake Campus - Chesapeake

36 Virginia Highlands Community College, Abingdon
37 Virginia Western Community College, Roanoke
38 Wytheville Community College, Wytheville
39 Richard Bland College, Petersburg

PRIVATE INSTITUTIONS

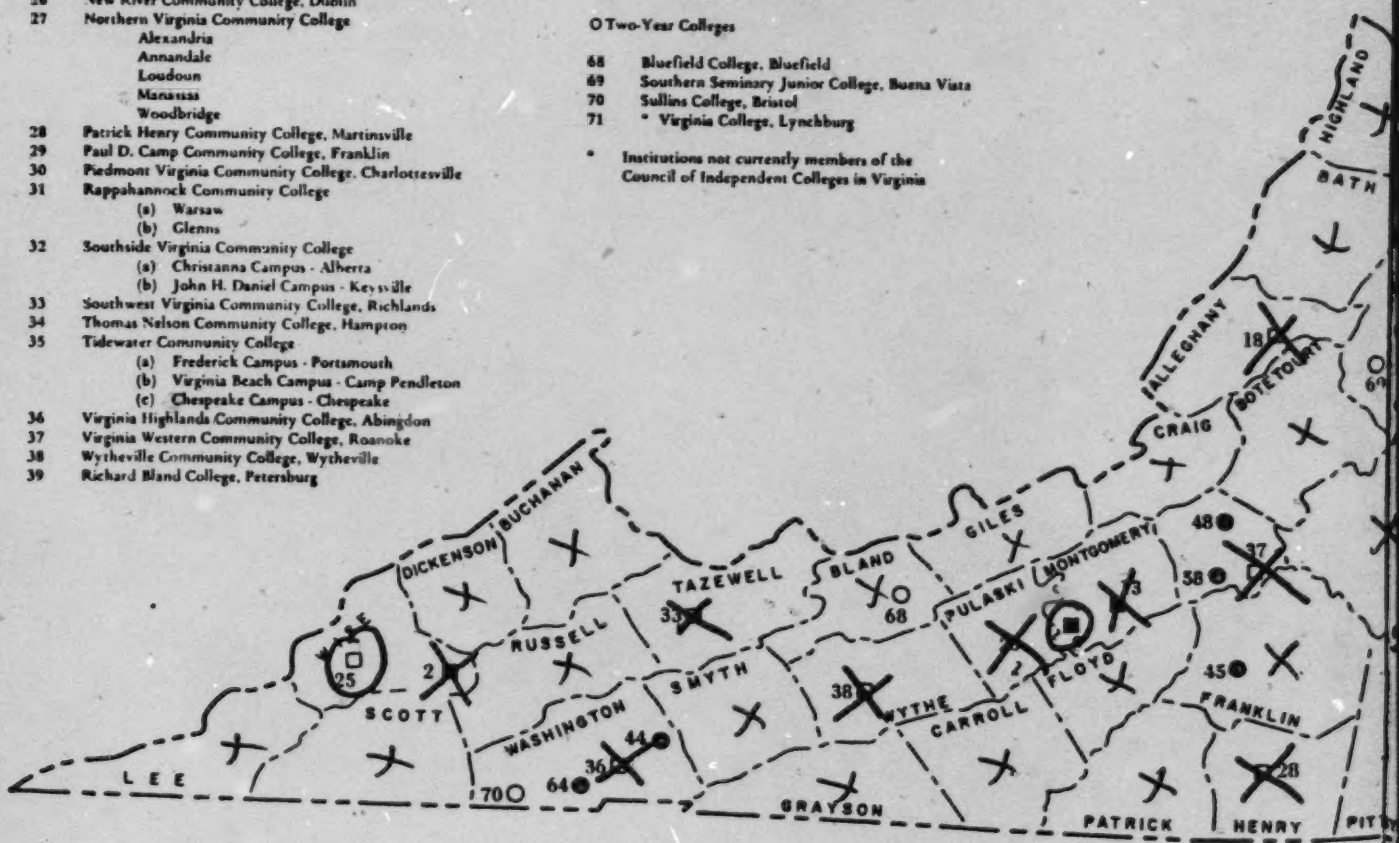
● Four-Year Colleges and Universities

40 Averett College, Danville
41 * Bridgewater College, Bridgewater
42 Eastern Mennonite College, Harrisonburg
43 * Eastern Virginia Medical School, Norfolk
44 Emory and Henry College, Emory
45 Ferrum College, Ferrum
46 Hampden-Sydney College, Hampden-Sydney
47 Hampton Institute, Hampton
48 Hollins College, Hollins College
49 * Institute of Textile Technology, Charlottesville
50 * Liberty Baptist Church, Lynchburg
51 Lynchburg College, Lynchburg
52 Mary Baldwin College, Staunton
53 Marymount College of Virginia, Arlington
54 * Presbyterian School of Christian Education, Richmond
55 * Protestant Episcopal Theological Seminary in Virginia, Alexandria
56 Randolph-Macon College, Ashland
57 Randolph-Macon Woman's College, Lynchburg
58 Roanoke College, Salem
59 Saint Paul's College, Lawrenceville
60 Shenandoah College and Conservatory of Music, Winchester
61 Sweet Briar College, Sweet Briar
62 * Union Theological Seminary in Virginia, Richmond
63 University of Richmond, Richmond
64 Virginia Intermont College, Bristol
65 Virginia Union University, Richmond
66 Virginia Wesleyan College, Norfolk
67 Washington and Lee University, Lexington

○ Two-Year Colleges

68 Bluefield College, Bluefield
69 Southern Seminary Junior College, Buena Vista
70 Sullins College, Bristol
71 * Virginia College, Lynchburg

* Institutions not currently members of the Council of Independent Colleges in Virginia



COMMONWEALTH OF VIRGINIA

DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

TRAFFIC AND SAFETY DIVISION

COUNTY SEATS AND INDEPENDENT CITIES

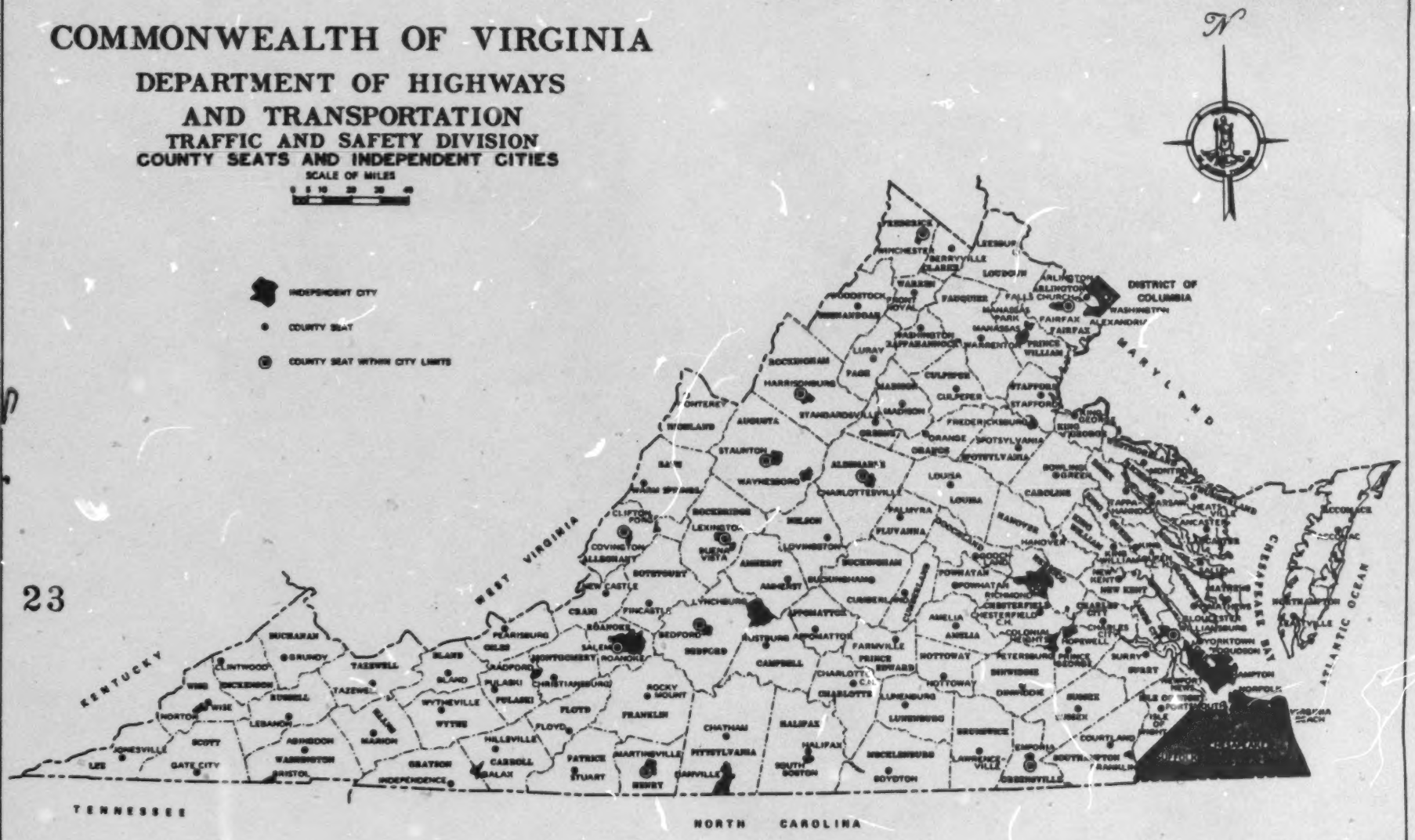
SCALE OF MILES

0 5 10 20 30 40

INDEPENDENT CITY

COUNTY SEAT

COUNTY SEAT WITHIN CITY LIMITS



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